

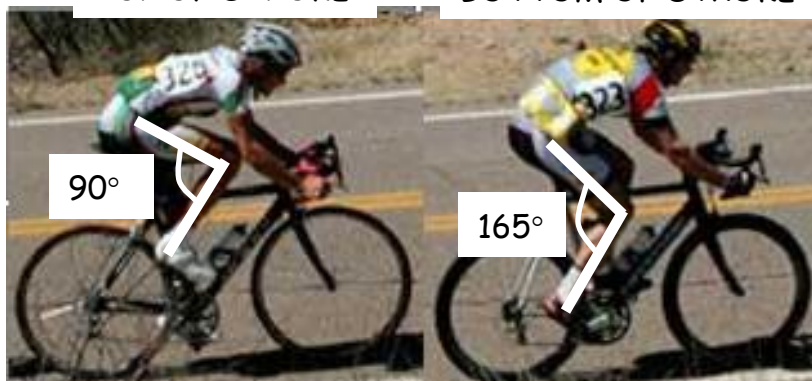
Unit 5 Trigonometry

Thinking Task #3 – Cycling Geometry

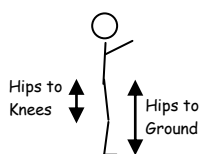
Competitive cyclists pay a great deal of attention to the *geometry* of their legs and how their bikes are set up. To provide the greatest leverage and achieve optimum output, a cyclist's knees must form a right angle (90°) with the pedals at the top of a stroke and an angle of 165° at the bottom of a stroke.

TOP OF STROKE

BOTTOM OF STROKE



To achieve these conditions, cyclists adjust the height of their seat to give the appropriate distances from their hips to the pedals



1. When Mr. Solomon is standing, the distance from his hips to his knees is 44 cm and from his hips to his Heels is 93 cm.
 - a. What is the distance from his Hips to his Heels if his knee forms a 90° angle?
 - b. What is the distance from his Hips to his Heels if his knee forms a 165° angle?

2. On Mr. Solomon's bike, the top of the bottom pedal is 85 cm from the base of the seat. For Mr. Solomon to achieve maximum output, how much should he raise the seat?
[Round to the nearest centimetre]



3. The table below lists the measurements of other cyclists. Would these cyclists be able to ride Mr. Solomon's bike? What seat height would they require?

Do the same procedure for 4 of your classmates and yourself. Would these cyclists be able to ride Mr. Solomon's bike? What seat height would they require?

[Round to the nearest centimetre]

Name	Distance (cm)	
	Hips to Knees	Hips to Floor
Terry	38	81
Colleen	45	96
Sergio	41	89
Classmate #1_____		
Classmate #2_____		
Classmate #3_____		
Classmate #4_____		
Yourself		

Bonus: Which rider would be best suited for this bicycle

- Meaning, which rider comes closest to having a 90° at the Top of the Stroke if the seat is set so that the rider's leg makes a 165° at the Bottom of the Stroke?
- Assume the difference in height between the Top and Bottom of the Stroke is 50 cm

Thinking Task 3: Help Sheet

Name	Distance (cm)			Hip to Heel Distance @ 90° (cm)	Distance of Mr. Solomon's bike from top of bottom pedal to adjusted seat (cm)	Is the bike adjusted well for that person?	What would the proper seat height adjustment be?
	Hips to Knees	Hips to Ground	Knees to Heels				
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Mr. Solomon	44	93					
Terry	38	81					
Colleen	45	96					
Sergio	41	89					
Classmate #1 _____							
Classmate #2 _____							
Classmate #3 _____							
Classmate #4 _____							
Yourself							

